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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,972	09/22/2006	Kouji Nishikawa	296637US0PCT	5623

22850 7590 08/03/2007

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EXAMINER	
HAMILTON, CYNTHIA	
ART UNIT	**PAPER NUMBER**
1752	

NOTIFICATION DATE	DELIVERY MODE
08/03/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/593,972	NISHIKAWA ET AL.	
	Examiner	Art Unit	
	Cynthia Hamilton	1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/22/06, 12/22/06*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/22/06, 12/22/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al (4, 990,428). With respect to instant claims 1-3 and 6-7, Example 6 of Shimizu et al discloses a species which anticipates the instant invention set forth by applicants wherein the copolymer of hydroxyphenylmethacrylamide are the polymers of instant formula (2) wherein n=0 and m=0 and R_1=Hydrogen atom and R2 is a single bond as there are no methylene groups present because n=0. With respect to instant claim 7, the element of Example 6 of Shimizu et al is inherently transferable in some manner thus being a transfer film. Applicants have not supplied further explicit definition to "transfer film" other than using the term. With respect to instant claims 2-3, the compositions of Example 6 of Shimizu et al is inherently able to be used in the process of forming a plated shaped article even when the shape is intended to e a "bump". The examiner notes for the record that instant claims 2-3 are drawn to the resin composition and not the intended use of the composition in the method of producing a plated shaped article optionally a bump. With respect to instant claim 8, the coating weight of 20 mg/dm^2 set forth by Shimizu et al for their layers is held to be inherently within the range of 5 to 200 μm.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al (4, 990,428) as applied to claim 1 above. The composition of Example 6 of Shimizu et al is an example of their disclosed composition wherein the polymer fits the description of the polymer of formula I in column 3 of Shimizu et al. The variation of the percentages of components as found in Example 6 of Shimizu et al within the range of amounts of components set forth in col. 6, lines 36-52 of Shimizu et al would have been the combining of prior art elements in known percentages to yield predicable results with respect to the formation of photosensitive planographic printing plates desired by Shimizu et al wherein the imaged layer can be developed with a solution containing mainly an alkaline substance as set forth in col. 1, Field of the Invention in Shimizu et al. The paragraph directed to the percentages in Shimizu et al is as follows:

> The proportion of each component constituting the photosensitive composition of the invention is 10 to 80, preferably 20 to 60 % by weight of the polymer having the carboxylic acid residue or carboxylic acid anhydride residue, 90 to 20, preferably 80 to 40 % by weight of addition polymerizable unsaturated compound and 0.1 to 20, preferably 1 to 10 % by weight of photopolymerization initiator.

The copolymer of Example 6 of Shimizu et al is as follows:

EXAMPLE 6 AND COMPARISON EXAMPLE 9

A photosensitive solution was prepared by repeating Example 1, but the copolymers were displaced with hydroxyphenylmethacrylamide/acrylonitrile/ethyl acrylate/methacrylic acid copolymer (molar ratio of monomers in the synthesis; 8/24/60/8, molecular weight about 60,000) synthesized by the conventional method. The anodically oxidized and grained aluminum plate No. 3 was coated with the photosensitive solution obtained above, and further covered with the protective layer to obtain a photopolymerizable photosensitive planographic printing plate. The planographic

and Example 1 of Shimizu et al wherein the copolymer of Example 6 is substituted is as follows:

B. Preparation of the sensitive layer

The anodically oxidized aluminum plates Nos. 1 to 5 were coated with a photosensitive solution obtained by dissolving 9 g of styrene/maleic acid anhydride (partial semi-ester) copolymer ("Stylite CM-2L", M.W.; about 5,000, provided by Sankyo Chemical Industry Co., Ltd.) 1 g of methyl methacrylate/methacrylic acid co-polymer synthesized by a conventional method (molar ratio of monomers in the synthesis; 9/1, M.W.; about 50,000) 10 g of trimethylolpropane triacrylate ("Biscoat 295" provided by Osaka Organic Chemical Industry Co , Ltd.), 0.4 g of 2-dibenzoyl-methylene-N-methyl-β-naphtothiazoline, 0.4 g of 2,4,6-tris(trichloromethyl)-1,3,5-triazine and 0.15 g of Victoria Pure Blue BOH (Hodogaya Chemical Co. Ltd.) in 180 g of ethyl cello-solve, by means of a whirler in dry amount of 20 mg/dm^2. Then the surface of each photo-sensitive layer was covered with a protective layer by applying an aqueous solution of polyvinylalcohol in dry amount of 20 mg/dm^2 to obtain a photosensitive planographic printing plate.

5. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Komano et al (6,010,824). With respect to instant claims 1-8, Examples III and IV of Komano et al read on the instant compositions and elements wherein polymers comprised of hydroxyphenylmethacrylate are disclosed. With respect to claims 1-4 and 6-8, Examples I and II, as well, from Komano et al read on the instant compositions. With respect to instant claims 2-3, the compositions of Examples I-IV of Komano et al are inherently able to be used in the process of forming a plated shaped article even when the shape is intended to e a "bump". The

examiner notes for the record that instant claims 2-3 are drawn to the resin composition and not the intended use of the composition in the method of producing a plated shaped article optionally a bump. With respect to instant claim 8, the coating weight of 3.5 g/m^2 set forth by Komano et al for their layers is held to be inherently within the range of 5 to 200 μm thickness layers.

6. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komano et al (6,010,824). With respect to claims 1-8, the photosensitive resins and elements of Komano et al disclose all of the instant compositions and elements wherein the polymer used is formula (1) m=0 and R_2 is a single bond with the exception of an explicit example of a transfer film as set forth in instant claims 7-8 if such terminology is in reference to a dry photoresist laminate wherein the image layer is to be temporarily stored on one substrate then transferred to another before imaging with electromagnetic radiation occurs. However, Komono et al does disclose examples of the compositions in their examples for PS plates in Examples I-IV and 2-1 in col. 25 wherein polymers comprised of hydroxyphenylmethacrylate are disclosed. Further, the use of the compositions of Komono et al are taught to be useful for printed circuit formation in the FIELD OF THE INVENTION and SUMMARY OF THE INVENTION at the top of co. 4. The polymeric binders found useful by Komono et al are set forth in the paragraph bridging col. 10-11 and are inclusive of those made from p=hydroxyphenyl (meth) acrylate and have weight average molecular weights of 10,000 to 200,000 with the preferred binders being as set forth in col. 11, lines 35-39, as follows:

> Preferred combinations of monomers of the polymeric binders include a combination of methacrylic acid/methyl methacrylate/benzyl methacrylate/hydroxyphenyl methacrylate and a combination of methacrylic acid/methyl methacrylate/styrene/hydroxyphenyl methacrylate.

The compounding ration of the the compositions of Komono et al is set forth in col. 12 lines 27-46 and is reproduced below:

> The compounding ratio of the above-mentioned components in the photosensitive resin composition more or less varies depending on its final use (e.g., use for a PS plate, a letterpress printing plate, a printed circuit board). Preferably, the photosensitive resin composition comprises from 10 to 60 parts by weight of the polymeric binder, from 20 to 70 parts by weight of the ethylenically unsaturated monomer, and from 0.1 to 30 parts by weight of photopolymerization initiator, including from 0.1 to 15 parts by weight of the triazine compound represented by formulae (I) to (V) and other photopolymerization initiators such as a titanocene compound, an acridine compound, etc., each based on 100 parts by weight of the total solids content of the photosensitive resin composition.
>
> The photosensitive resin composition is prepared by mixing the above-mentioned components with the aid of from 10 to 1,000 parts by weight of a known solvent, such as alkylene glycol mono(or di)alkyl ethers, ketones, alcohols and carboxylic acid esters, per 100 parts by weight of the total solids content of the photosensitive resin composition.

This composition is stated by Komono et al as useful in lines 47-54, as a photoresist, photosolder resist or plating resist and at the top of col. 13, Komono et al discloses the formation

of a dry film resist on a PET, i.e. polyethylene terephthalate as known by workers of ordinary skill in the art, substrate in a dry film thickness of from 1-4 g/m^2. The example of preparation in col. 24, lines 22-53 of Komono et al is drawn to preparation of Printed Circuit Board and the dry thicnknes of the layer is 50 μm. Thus, with respect to instant claims 1-8, Komono et al teach the formation of transferable photoresists for the formation of printed circuits with thicknesses within the range sought by applicants to form etch resists, plating resists and solder resists thus combining the known prior elements of dry photoresists with the known methods of circuit board formation to yield the desired results of Komono et al photosensitive resin compositions with very high sensitivity and excellent developability when using argon laser light to produce plating resists as set forth in col. 1 of Komono et al.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Komano et al (6,010,824)as applied to claim 1 above, and further in view of Danielson et al (US 6,426,176 B1). With respect to instant claim 9, Komano et al teaches the use of compositions like that of instant claim 1 as plating resists and solder resists as set forth above. Komano et al does not teach the methods of plating with such plating resists and solder resists. Danielson et al teache teaches a process which reads on that of instant claim 9 with the exception of the instant composition of claim 1. Claim 1 below from Danielson et al is the process which has all the instant steps but is not specific about the photoresist used:

1. A method of forming a conductive structure on an integrated circuit substrate comprising:

forming a photoresist layer over the substrate;

patterning the photoresist layer to define an opening extending to a metal part on the substrate;

plating a metal bump of a first material on the substrate so that the metal bump electrically contacts the metal part on the substrate, the metal bump having a stem in the opening in the photoresist layer and a head on the stem and over the photoresist layer;

removing the photoresist layer to expose the stem; and

plating a protective layer on the metal bump, the protective layer forming on the head and on the exposed stem, the protective layer being of a second material, wherein the first material has a first conductivity and the second material has a second conductivity which is higher than the first conductivity.

The method is also set forth in col. 2 of Danielson et al wherein it is clear that a wafer can be used ant htat a conductive metal layer is deposited thereon before the photoresist I layer is deposited on the metal.

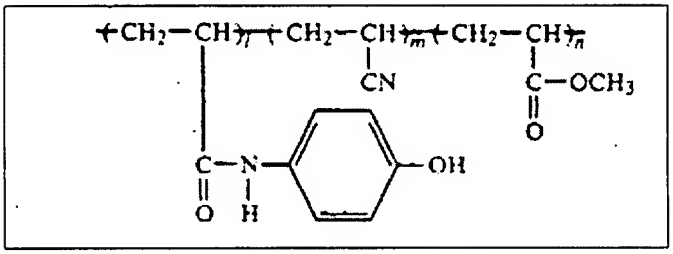
This invention relates to a method of forming conductive structure on an integrated circuit substrate such as a semiconductor die or wafer. For the most part the conductive structure is formed according to a process which is known as the controlled collapse chip connect (C4) process. A conductive metal layer is deposited on the substrate. A photoresist layer is then deposited on the conductive metal layer. The photoresist layer is then patterned to define openings above bond pads on the substrate. A lead containing bump is then formed within each opening. The bump fills the opening and partially overlies the photoresist layer. The bump is formed utilizing an electroplating technique. A tin protective layer is then formed on the bump. The photoresist layer may be removed before or after forming the tin protective layer. In the case where the photoresist layer is removed after the tin protective layer is formed, the conductive metal layer may then be partially removed to leave a metal portion below each bump. The protective layer reduces the contact resistance between the bump and a probe card which is brought into contact with the conductive structure.

The bump is electroplated down after patterning then stripped ant the conductive layer on the wafer partially removed. Etching is the method set forth in col. 4, lines 4-14. Thus, Danielson et al teaches all but the specific photoresist set forth in instant claim 9. With respect to instant claim 9, the use of known plating photoresists such as that taught by Komano et al in the plating processes of Danielson et al would have been the combining prior art elements according to known methods to yield predictable results.

8. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konica Corp (JP 08-179505 A) as evidenced by the Patent Abstracts of Japan given by applicants with the Japanese document as a cover sheet and the English translation generated by machine at the AIPN site by the USPTO of JP 08-179505 A. With respect to the English translation of Konica Corp, because the tabular data has not been fully translated by the machine into English, the examiner cannot determine what was actually used by Konica Corp in their explicit examples. For this reason, because a full clear translation is not available, only a rejection under 5 U.S.C. 103(a) is possible. Konica Corp teach the use of "negative type photosensitive compositions" with excellent developability which are comprised of alkali-soluble polymers made from monomers inclusive of p-hyroxyphenyl (meta) acrylamide or p-hydroxyphenyl (meta) acrylamide in the machine translation at [0033]. The "meta" is taken to reference "metha" when considering the English Abstract wherein R1 is taken as H or methyl. These polymers are also taught be combined with an addition polymerizable monomer and a photopolymerization initiator in the English Abstract of Konica Corp. In [0016] of Konica Corp the compound which has addition-polymerization nature is also taught as unsaturated and inclusive of triethylene glycol di (metha)acrylate, "trimethylol propane bird (meta) acrylate as well as others. The examiner has assumed "metha" and "meta" are the machine translations for "meth" and would assume a worker of ordinary skill in the art would assume the same. The amounts of monomer to polymer used is taught by Konica Corp in [0018] as 10-50 weight % addition polymerizable compound to total solids in the "negative type photosensitive compositions". The photoinitiator is used in .05 to 30 weight % total solids as set forth in [0021] in Konica Corp and the use of a

coating solvent is set forth in [0062] to [0065]. IF the binder is considered to be present in sufficient amount to allow developability of the imaged layer, then it must be present in sufficient amounts to do such. With the addition polymerizable compound being present in 50 % to 10% of the solids content then the Binder would bee a significant portion of the remainder of weight percent not taken up by the photopolymerization initiator and addition polymerizable compound which would be the remaining 20 to 80 weight % of the solids content if not considering the pigment addition and diazo compound addition set forth as optional. With respect to instant claims 1-6, the photosensitive compositions of Konica Corp would make prima facie obvious the instant compositions because the use of any of the cited addition polymerizable compounds with the polymers of Konica corp in the range of compounding given to form the negative type photosensitive compositions of Konica Corp. to obtain the expected excellent developability in an aqueous alkaline developer without the use of an organic solvent would have been predictable. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Werthheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 UAPQ2d 1934 (Fed. Cir. 1990). See particularly MPEP 2144.05.

9. Claims 1-4 and 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Sasa et al (5,068,689). With respect to instant claims 1-4 and 6-7, the compositions of Experiment Example 2 of Sasa et al anticipate the instant compositions. The polymer used is



and the monomer used is

Pentaerythritol tetraacrylate ant the polymerization initiator is Benzophenone

and the solvent is Methyl cellosolve and it is coated onto an ethylene-vinyl acetate copolymer resin layer coated onto a polyethylene terephthalate film. These elements were imaged then developed and the images transferred to art paper as set forth in col. 16 of Sasa et al thus the elements made in Example 2 of Sasa et al are transfer films.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Hamilton whose telephone number is 571-272-1331. The examiner can normally be reached on Monday through Friday 9:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on (571) 272-0729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Cynthia Hamilton
Primary Examiner
Art Unit 1752

July 30, 2007

CYNTHIA HAMILTON
PRIMARY EXAMINER